James L. Flanagan was born 26 August 1925 and grew up on a cotton farm in Greenwood, Mississippi. He graduated from high school in 1943 and completed his freshman year at Mississippi State University before joining the U.S. Army at age 18. He returned home about three years later, picked up his studies with the help of the G.I. Bill, and graduated with a B.S. degree in electrical engineering. He continued his education at the Massachusetts Institute of Technology (MIT), where he received the M.S. and doctor of science degrees in electrical engineering in 1950 and 1955, respectively. He was assistant professor of electrical engineering at Mississippi State University (1950–1952) and an electronic scientist at the Air Force Cambridge Research Lab (1955–1957). In 1957, he joined AT&T Bell Laboratories. He was with Bell Laboratories for 33 years, retiring in 1990 as director, Information Principles Research Laboratory. Subsequently, Jim served 15 years as a Board of Governors professor and university vice president for research at Rutgers University, New Jersey. Jim retired from Rutgers in 2005 at the age of 80.

I first met Jim Flanagan in 1963 when I was given the opportunity to join his department as a fresh new MIT cooperative (co-op) education student. Jim quickly became my mentor, boss, colleague, and, most of all, friend. I knew him for more than 50 years, and it has been an honor and a privilege to know the man as well and as long as I did.

TECHNOLOGICAL CONTRIBUTIONS

It goes without saying that first and foremost, Jim Flanagan was an outstanding technologist. His research career spanned digital communications, speech processing, and acoustics. His individual research included comprehensive modeling of basilar membrane motion in the inner ear, leading to useful engineering models of auditory signal processing. It also provided the theoretical basis and experimental development of a physiologically based model of vocal excitation for speech production, which provided a basis for advanced types of vocoders. Jim’s early research included theoretical and practical studies of formant and phase vocoders along with perceptual experiments that quantified the relationship between hearing and speech models and led to an understanding of fundamental discrimination limits of the ear.

JAMES L. FLANAGAN (1925–2015)

Birthplace
Greenwood, Mississippi, United States

Education
B.S.E.E. degree, 1948, Mississippi State University;
S.M. and Sc.D. degrees, 1950 and 1955, respectively, Massachusetts Institute of Technology

First Job
Assembling Christmas toys for J.C. Penney Co. in Greenwood

Major Awards
IEEE Medal of Honor, L.M. Ericsson International Prize in Telecommunications, National Medal of Science, Marconi International Fellowship, Gold Medal of the Acoustical Society of America; Member of National Academy of Sciences and National Academy of Engineering

Connections to IEEE Signal Processing Society (SPS)
President, IEEE SPS; Society Award, SPS, 1975; IEEE James L. Flanagan Speech and Audio Processing Award, sponsored by SPS

In His Own Words

Read More About Him
• Obituary, IEEE Inside Signal Processing eNewsletter, Sept. 2015.
He led research efforts that resulted in the development of what are known as adaptive waveform coders. These coders automatically adjust to characteristics of the speech that they encode. His work on waveform coders provided the basis for many of the low bit rate coders presently used.

He was a pioneer in the field of speech and audio processing, and he had outstanding insights that changed the way we communicate both people to people and people to machines. Jim always had an eye on long-term goals, at the same time working on current technologies that greased the wheels for the many technical contributions made during his long career. By way of example, Jim set as his early research goal a ten times reduction in bandwidth of the channel for human-to-human voice communication. When queried as to why such an aggressive goal, he would invariably reply that AT&T would derive the most benefit from attaining the goal.

Another example of Jim’s ability to see into the future was his long-range goal of inventing ways to give a computer a mouth to speak and an ear to listen and learn. Much of the research that led to today’s working synthesis and recognition systems originated in Jim’s lab, thereby realizing his vision of customer care by machine-generated voice commands.

Perhaps the best validation of Jim’s vision in this area was his paper “Computers that Talk and Listen; Man-Machine Communication by Voice,” which was published in 1976 in Proceedings of the IEEE. This paper predicted user agents such as Siri and Cortana—39 years before their appearance in today’s smartphones.

The best validation of Jim’s vision was his 1976 paper “Computers that Talk and Listen; Man-Machine Communication by Voice”—40 years before Siri and Cortana in smartphones.

Finally, Jim had a clear vision of how a range of disparate multimedia technologies could work in unison to create something bigger and more useful as a whole. He called this idea the HuMaNet (Human-to-Machine Network) system integrating voice and image processing technologies along with advanced networking capability, leading to the concept of agent-based visual systems.

No set of reflections on the technical achievements of Jim Flanagan could be considered authoritative without the mention of Jim’s classic and pioneering textbook, Speech Analysis, Synthesis, and Perception. This book has correctly been referred to as the “bible of speech processing” and has been used to resolve issues and provide insight in speech processing for the past 50 years and will undoubtedly continue in this role for many years to come.

Finally, Jim was the author or coauthor of more than 200 publications and more than 50 patents, including the design patent on the artificial larynx (providing speaking capability to people who had tracheotomies) and one patent on handling voice in a data network, which was a forerunner to voice over IP services.

In addition to the numerous technological contributions, Jim was widely recognized as an insightful technical speaker and writer. He had a real knack for getting to the essence of complex concepts and making them clear to an audience with a wide range of experience and technical expertise.

Managerial Skills
Jim spent most of his technical career managing other individuals as a department head and then as a lab director. He guided the careers of more than two generations of individuals who grew to positions of prominence in their own right. Starting with MIT co-op students, Jim was always available to discuss the options people had in their technical careers and give them well thought out advice as to how best to proceed with virtually any aspect of their technical careers. I was one of the early MIT co-ops, as were Joe Hall and Aaron Rosenberg, and all of us continued to work with Jim until his retirement as manager at Bell Labs.

Jim Flanagan was an outstanding judge of technical talent and thereby was able to attract and hire the best and the brightest individuals. Jim also realized that a lot of good talent was outside Bell Labs, and he continually thought of ways to bring such talent into Bell Labs to work alongside members of his department. Through such programs, Jim attracted Kenzo Ishizaka to work with him on vocal cord models for the human vocal tract, Fumitada
Itakura to work on speech recognition, and Sadaoki Furui to work on speaker verification, among dozens of other such collaborations.

A hallmark of Jim’s managerial skills was the general feeling of the broad research community that every time one research challenge was met and solved by members of Jim’s team, Jim was already prepared with a new set of challenges for the team, thereby illustrating his out-of-the-box thinking skills.

As a manager, Jim considered it his responsibility to call attention to the accomplishments of the researchers under his supervision. He did this for 33 years at Bell Labs and for 15 years at Rutgers. Although he contributed many ideas as part of his management style, he was scrupulous in giving credit where it was due to those who picked up on his ideas and carried them forward.

Jim inspired individuals to be the best that they could be, and he took interest in all aspects of their technical growth and technical maturity. He guided individuals by such basic principles such as “you never get a second chance to make a great first impression,” generally followed by the sage advice to “do it right the first time.”

OUTSTANDING SERVICE TO THE TECHNICAL COMMUNITY AND TO THE NATION

Jim Flanagan was a model in his role of providing outstanding service to the technical community and to the nation. While at Bell Labs, Jim served the nation at a critical time in history by being part of a Blue Ribbon committee that analyzed the infamous 18-min gap in the Watergate tapes, and by his service in the analysis of the final spoken words in the Challenger explosion.

Jim believed strongly in the role of service as a way of paying back the debt you accumulated by taking advantage of all that the various technical societies offered.

The way to pay off that debt was to volunteer and assume leadership positions in both the IEEE (where Jim served as president of the Group on Audio and Electroacoustics) and the Acoustical Society of America, where he served as president. Jim also had a way of making sure that all the people that he mentored also assumed positions of leadership at the appropriate times in their technical careers.

RECOGNITION OF TECHNICAL ACHIEVEMENTS

Jim received numerous awards throughout his career, including the 1996 National Medal of Science, presented at the White House by U.S. President Bill Clinton, the Gold Medal of the Acoustical Society of America in 1986, and the IEEE Medal of Honor in 2006. Jim was elected to the National Academy of Engineering in 1978 and to the National Academy of Sciences in 1983.

For his groundbreaking contributions, the IEEE established the IEEE James L. Flanagan Speech and Audio Processing Award in 2002. This award is sponsored by the IEEE Signal Processing Society and is awarded to individuals for an outstanding contribution to the advancement of speech and/or audio signal processing.

Jim is survived by his wife Mildred Bell (Flanagan); sons Stephen, James, and Aubrey; and grandchildren Aubrey, James, Bryant, Antonia, and Hanks.

Jim Flanagan was a very special individual, and he will be missed both by his family and by his many friends.

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AUTHOR

Lawrence Rabiner (lrr@jove.rutgers.edu) was with Bell Laboratories Research (1962–1995) and then AT&T Labs Research (1995–2002), where he served as vice president of research. Since 2002, he has been a distinguished professor of Rutgers University. He is a member of the U.S. National Academy of Engineering and National Academy of Sciences. [SP]